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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
IM, JUNGHWA M	

ART UNIT	PAPER NUMBER
2811	

DATE MAILED: 11/18/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/655,206	SONG, HO UK	
	Examiner	Art Unit	
	Junghwa M. Im	2811	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 August 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

Applicant's election of claims 1-14 in the reply filed on August 12, 2004 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 9 and 14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 9 recites a limitation of "the metal patterns are inclined with a predetermined angle" and the instant specification does not disclose this aspect.

Claim 14 recites a limitation of "the seed metal layer and metal patterns are alternately aligned while forming a slightly inclined angle" and this recitation is confusing. Note that the figures of the instant invention show that metal patterns are formed directly on top of the seed metal layer while the size of the contact area is the same.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1 and 7 are rejected under 35 U.S.C. 102(e) as being anticipated by Chen et al. (US Pub. 2003/0133274), hereinafter Chen.

Regarding claim 1, Fig. 7 of Chen shows a semiconductor package device comprising:

a semiconductor chip [400] including a plurality of bonding pads [406] having a microscopic size and aligned at a minute interval;

a planar layer [402] formed on the semiconductor chip so as to expose the bonding pads;

metal patterns [342-1, 342-2] formed on the planar layer and having a size larger than a size of the bonding pads in such a manner that at least some parts of the metal patterns are connected to the bonding pads; and

a seed metal layer [330 in Fig. 3E] interposed between the planar layer and the metal patterns.

Regarding claim 7, Fig. 7 of Chen shows the metal patterns [342-1] on top of the device 400] are aligned in left and right directions about the bonding pads [405].

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chen.

Regarding claim 3, Fig. 7 of Chen shows substantially the entire claimed structure except "a total thickness of the metal patterns and the seed metal layer is about 1 to 10 um." However, it would have been obvious to one of ordinary skill in the art at the time of the invention made to have a total thickness of the metal patterns and the seed metal layer about 1 to 10 um to accommodate the design specification, since it would have been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only in routine skill in the art. *In re Aller,* 105 USPQ 233.

Claims 2, 4, 10 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen in view of Mikagi et al. (US Pub. 2003/0025202), hereinafter Mikagi.

Regarding claim 2, Fig. 7 of Chen shows substantially the entire claimed structure except "wherein an oxide layer is interposed between the planar layer and the seed metal layer in order to release stress applies thereto." Fig. 4 of Mikagi shows an oxide layer [14; paragraph 0047] is interposed between the planar layer and the seed metal layer [15, 16, 17].

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to incorporate the teachings of Mikagi into the device of Chen in order to have an oxide layer is interposed between the planar layer and the seed metal layer to improve the reliability of the wiring structure.

Regarding claim 4, Fig. 7 of Chen shows substantially the entire claimed structure except "the seed metal layer has a triple stack structure including Ti-NiV-Cu layers." Fig. 4 of Mikagi shows the seed metal layer [15, 16, 17] with a triple stack structure including Ti-NiV-Cu layers.

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to incorporate the teachings of Mikagi into the device of Chen in order to have the seed metal layer with a triple stack structure including Ti-NiV-Cu layers to improve the internal stress.

Regarding claim 10, Fig. 7 of Chen shows a semiconductor package device comprising:

a semiconductor chip [400] including a plurality of bonding pads [406] having a microscopic size and aligned at a minute interval;

a planar layer [402] formed on the semiconductor chip so as to expose the opening for the bonding pads;

a seed metal layer [330 in Fig. 3E] and metal patterns [342-1, 342-2] sequentially formed on the planar layer and having a size larger than a size of the bonding pads in such a manner that at least some parts of the seed metal layer and metal patterns are connected to the bonding pads, the seed metal layer and metal patterns being aligned in left and right directions about the bonding pads.

Fig. 7 of Chen shows substantially the entire claimed structure except "wherein an oxide layer is interposed between the planar layer and the seed metal layer in order to release stress applies thereto." Fig. 4 of Mikagi shows an oxide layer [14; paragraph 0047] is interposed between the planar layer and the seed metal layer [15, 16, 17].

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to incorporate the teachings of Mikagi into the device of Chen in order to have an oxide layer is interposed between the planar layer and the seed metal layer to improve the reliability of the wiring structure.

The subject matter regarding claim 12 has been discussed in claim 4 above.

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chen in view of Gleason (US 6709980).

Regarding claim 5, Fig. 7 of Chen shows substantially the entire claimed structure except "the bonding pads have a size of 10 x 10 um in width and length." Gleason discloses a bond pad in size of 10um squares.

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to incorporate the teachings of Gleason into the device of Chen in order to have the bonding pads with a size of 10 x 10 um in width and length to meet the design specification.

In addition, it would have been obvious matter of design choice since such a modification would have involved a mere change in the size of a component. A change in size is generally recognized as being within the level of ordinary skill in the art. *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966).

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chen in view of Tong et al. (US 6617237), hereinafter Tong

Regarding claim 6, Fig. 7 of Chen shows substantially the entire claimed structure except "the metal patterns include an Al-Ag alloy or a Cu-Ag alloy." Tong discloses a metal pattern/bump on the seed metal layer including an Al-Ag alloy or a Cu-Ag alloy [col. 5, lines 30-34].

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to incorporate the teachings of Tong into the device of Chen in order to have the metal patterns including an Al-Ag alloy or a Cu-Ag alloy since these alloys are well-known in the industry and readily available.

Claims 8-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen in view of Poo et al. (US 6611052), hereinafter Poo.

Regarding claims 8-9, Fig. 7 of Chen shows substantially the entire claimed structure except the arrangement of the metal pattern/metal conductor. Fig. 1B of Poo show the metal pattern/conductor [32] are alternately aligned one by one in a zigzag manner in left and right directions or upward and downward directions about the bonding pads [34] while being with a predetermined angle [32 on the right side].

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to incorporate the teachings of Poo into the device of Chen in order to have the metal pattern/conductor alternately aligned one by one in a zigzag manner in left and right directions or upward and downward directions about the bonding pads [34] while being with a predetermined angle for reduction of the package size.

Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chen and Mikagi in view of Tong.

Regarding claim 11, the combined teachings of Chen and Mikagi fail to show that "the metal patterns include an Al-Ag alloy or a Cu-Ag alloy." Tong discloses a metal pattern/bump on the seed metal layer including an Al-Ag alloy or a Cu-Ag alloy [col. 5, lines 30-34].

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to incorporate the teachings of Tong into the device of Chen and Mikagi in order to have the metal patterns including an Al-Ag alloy or a Cu-Ag alloy since these alloys are well-known in the industry and readily available.

Claims 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen and Mikagi in view of Poo.

Regarding claim 13, Fig. 7 of Chen shows a semiconductor package device comprising:

a semiconductor chip [400] including a plurality of bonding pads [406] having a microscopic size and aligned at a minute interval;

a planar layer [402] formed on the semiconductor chip so as to expose the bonding pads;

metal patterns [342-1, 342-2] formed on the planar layer and having a size larger than a size of the bonding pads in such a manner that at least some parts of the metal patterns are connected to the bonding pads; and

a seed metal layer [330 in Fig. 3E] interposed between the planar layer and the

metal patterns the seed metal layer and metal patterns being aligned in left and right directions about the bonding pads.

Fig. 7 of Chen shows substantially the entire claimed structure except "wherein an oxide layer is interposed between the planar layer and the seed metal layer in order to release stress applies thereto" and "the seed metal layer and metal patterns being alternately aligned one by one in a zigzag manner in left and right directions or upward and downward directions about the bonding pads." Fig. 4 of Mikagi shows an oxide layer [14; paragraph 0047] is interposed between the planar layer and the seed metal layer [15, 16, 17].

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to incorporate the teachings of Mikagi into the device of Chen in order to have an oxide layer is interposed between the planar layer and the seed metal layer to improve the reliability of the wiring structure.

The combined teachings of Chen and Mikagi fail to show "the seed metal layer and metal patterns being alternately aligned one by one in a zigzag manner in left and right directions or upward and downward directions about the bonding pads." Fig. 1B of Poo show the metal pattern/conductor [32] are alternately aligned one by one in a zigzag manner in left and right directions or upward and downward directions about the bonding pads [34].

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to incorporate the teachings of Poo into the device of Chen and Mikagi in order to have the metal pattern/conductor alternately aligned one by one in a

zigzag manner in left and right directions or upward and downward directions about the bonding pads [34] for reduction of the package size.

Regarding claim 14, insofar as understood, Fig. 1B of Poo show wherein a conductive metal patterns are alternately aligned while forming a slightly inclined angle [bent portion of 32 on the right].

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Junghwa M. Im whose telephone number is (571) 272-1655. The examiner can normally be reached on MON.-FRI. 8:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie C Lee can be reached on (571) 272-1732. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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